

## Bioenergy Technologies Office Overcoming Barriers to Renewable Fuel Scale-up and Demonstration Request for Information (RFI) DE-FOA-0002615

DATE: December 23, 2021  
SUBJECT: Request for Information (RFI)

### Description

This RFI seeks input from biofuels producers and technology developers about their readiness to scale process technologies to pilot- and demonstration-scale sustainable aviation fuel (SAF), renewable diesel and renewable marine fuels. This information is necessary for DOE's Bioenergy Technologies Office (BETO) to chart the potential growth of domestic renewable fuels production by 2030 and to understand the barriers in scaling renewable fuel production pathways. This RFI also seeks information on how DOE can best assist biofuels production stakeholders in their research and development (R&D) and scaling up of their technologies through demonstration scale.

### Background

Significant progress has been made on biofuels technology development through both government and private sector research, development, and demonstration (RD&D) over the last 10 years and some technologies are now ready for scaling-up to support their ultimate commercialization. BETO recognizes the availability of financing for first-of-a-kind process systems can be a barrier to commercializing advanced biofuels. Constructing and operating pilot- and demonstration-scale facilities is essential to de-risk technology and ensure the success of subsequent commercial scale projects. BETO defines the minimum throughput of pilot- and demonstration-scale facilities as 20,000 gallons per year and 1,000,000 gallons per year, respectively, of liquid (at standard temperature and pressure) renewable fuel.

BETO has created a scale-up strategy to assist with renewable fuel technology advancement that consists of the following elements:

- Focus on RD&D of sustainable aviation, renewable diesel, and sustainable marine fuels.
- Provide opportunities for pre-pilot, pilot-, and demonstration-scale projects
- Allow a variety of feedstocks
  - Traditional cellulosic feedstocks
  - Municipal solid waste (MSW), CO<sub>2</sub>, CO, flue gas, and biogas
  - Grain starch and oilseeds
- Allow bioproduct opportunities to enable biofuels development
- Leverage existing industrial infrastructure supply chains, and resources
- 1<sup>st</sup> Generation ethanol, pulp and paper, petroleum refineries

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- Encourage the development and use of predictive models and high-performance computing as tools to lower risk and accelerate scale-up of biotechnologies

BETO seeks input from bioenergy companies that are planning to scale up and demonstrate SAF, renewable diesel and renewable marine fuel technologies from the lower Technology Readiness Levels (TRLs) to the pilot and demonstration stage and eventual commercialization. This information will inform a multi-year scale-up strategy resulting in the construction and operation of several SAF, renewable diesel and/or renewable marine fuel production pathways.

## **Purpose**

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders on issues related to the scale-up of renewable fuel production technologies. EERE is specifically interested in information about:

1. plans by developers to scale promising SAF, marine, and renewable diesel production pathways to pilot or demonstration,
2. barriers faced in scaling these technologies to commercial scale,
3. opportunities to reduce greenhouse gas (GHG) emissions from corn starch-based ethanol production facilities,
4. feedback on BETO's scale-up strategy,
5. opportunities to leverage National Laboratory Process Development Units (PDU) to scale-up renewable fuels, and
6. feedstock production and supply.

This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

## **Disclaimer and Important Notes**

This RFI is not a Funding Opportunity Announcement (FOA); therefore, EERE is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program

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strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic. Please see the Request for Information Response Guidelines section of this RFI for requirements and methods of responding

### **Confidential Business Information**

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

### **Evaluation and Administration by Federal and Non-Federal Personnel**

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to EERE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

### **Request for Information Categories and Questions**

#### **Category 1: Biofuel Pathway Scale-up Forecasts**

Please describe your enterprise plans to scale-up SAF, marine, and renewable diesel production pathways to pilot, demonstration, and commercial scale

- a) Include information on the timing, technical pathway, production capacity, feedstocks, GHG reduction potential, budgetary capital costs, and unit production costs (\$/g or \$/l).

#### **Category 2: Barriers to Scale-up of SAF, Marine, and Renewable Diesel Technologies**

Please provide specific information on barriers to the scale-up and commercialization of promising renewable fuel technologies and suggestions on how DOE or other

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stakeholders may be engaged in overcoming these barriers. Barriers can be of any category including technical, financial, legal, contractual, policy, etc.

- i) Demonstration Scale facilities are constructed and operated to prove technical and economic viability of a renewable fuel pathway. What are the performance metrics and associated values required of Demonstration Scale plants to validate commercial readiness? Typical examples of performance metrics include but are not limited to the number of hours continuous on-stream operation, product or co-product specifications, production rates as a percentage of nameplate capacity etc.
- ii) Engineering Procurement and Construction (EPC) firms building commercial biorefinery facilities are typically required to provide performance guarantees and other assurances for plant owners to secure project financing. What are the Demonstration Scale plant performance metrics required by EPC firms in order to guarantee first Commercial Scale plant performance?

**Category 3: Leveraging First Generation Ethanol and Other Incumbent Industries**

1. First generation ethanol plants in the U.S. have the potential to produce SAF with the economic advantage of existing infrastructure, mature supply chains, and skilled labor. DOE would like to understand current plans or opportunities under consideration by first generation ethanol producers to evolve their production to produce other renewable fuels and to reduce GHG emissions associated with first generation ethanol production (through any technology improvements such as carbon capture and storage, generation of renewable power, advanced separations technology, etc.).
  - a. Please provide specific information on the specific technology improvements being considered for first generation ethanol plants.
2. Other industries such a pulp and paper have the potential to supply low-cost feedstocks and leverage existing infrastructure to produce renewable fuels. DOE would like to understand what potential technologies are being explored by other industries and related information on GHG reduction, capital cost, and potential barriers.
  - a. Please provide specific information on the aforementioned and any other technology improvements being considered for other industries such a pulp and paper that have the potential to supply low-cost feedstocks and leverage existing infrastructure to produce renewable fuels.

**Category 4: BETO Scale-up of Biotechnologies Strategy**

1. In the recent DE-FOA-0002396 FY21 BETO Scale-up and Conversion FOA, <https://eere-exchange.energy.gov/Default.aspx?Foald5295fbd3-50f4-4dfb-8c70-3f6911c5da10>, BETO introduced a scale-up structure to develop pre-pilot, pilot- and demonstration-scale technologies. To provide industry with less uncertainty, BETO is considering the implementation of a consistent multi-year effort to support renewable fuels scale-up.

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- a. In light of BETO's recent Scale-up and Conversion FOA, please describe and general recommendations, modifications or improvements that could be made to our FOA to inform future DOE funding opportunities.
- b. In the referenced FY21 FOA, BETO proposed allowing on the order of \$15 million to cost share for pilot plant projects, and the order of \$40 million for demonstration plant projects. Further these projects required 50% or more cost share from the applicant. For your technology pathway, what is the approximate total cost for a successfully operated and tested integrated pilot and/or demonstration scale project and how much funding would DOE need to cost share to enable your project to be built?
- c. Please describe any other forms of financial assistance beyond Federal Grants and Cooperative Agreements that would accelerate the scale-up and commercialization of renewable fuels.

**Category 5: Leveraging National Laboratory Process Development Units (PDU) to Scale-up Renewable Fuels.**

BETO supports scale-up facilities at National Laboratories that are utilized to scale technologies developed by the National Laboratories and provide services for private companies and other entities. The PDUs are located at the following locations:

- a. Idaho National Laboratory – Biomass Feedstock User Facility  
(<https://bfnufl.inl.gov/SitePages/BFNUF%20Home.aspx>)
  - b. Pacific Northwest National Lab – Hydrothermal Processing of Biomass  
(<https://www.pnnl.gov/process-development-units>)
  - c. National Renewable Energy Lab – Pilot-Scale Integration  
(<https://www.nrel.gov/bioenergy/ibrf.html>)
  - d. National Renewable Energy Lab – Thermal and Catalytic Process Development Unit  
(<https://www.nrel.gov/bioenergy/tcpdu.html>)
  - e. Lawrence Berkeley National Lab – Advance Biofuels and Bioproducts PDU  
(<https://abpdu.lbl.gov/>)
1. Please describe what aspects of these DOE-funded PDUs can enable your scale-up plans.
  2. Please describe what aspect of these DOE-funded PDUs are not helpful or deter you from utilizing them for scale-up.

**Category 6: Feedstock Production & Supply**

1. Corn farming is a significant contributor to the carbon intensity/GHG emissions associated with first generation ethanol production. BETO would like to understand what agricultural practices are being planned and/or implemented to significantly reduce the carbon intensity of corn production.

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- a. Please provide any specific information or corn farming practices being planned and/or implemented to reduce the carbon intensity and/or GHG emissions of corn production.
2. Preparing feedstocks meeting stringent quality specifications necessary for biofuel or bioproduct manufacturing requires integrated infrastructure to ensure robust supply chains for large scale production.
  - a. Please describe the challenges and barriers to establishing integrated infrastructure for the production, processing and delivery of biorefinery feedstocks.

### **Request for Information Response Guidelines**

Responses to this RFI must be submitted electronically to [Biofuels\\_FY22\\_RFI@ee.doe.gov](mailto:Biofuels_FY22_RFI@ee.doe.gov) no later than 5:00pm (ET) on January 31, 2022. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 10 pages in length, 12 point font, 1 inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable. Respondents may answer as many or as few questions as they wish.

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

In addition to providing written responses to this RFI, respondents may request a 30-minute individual discussion with a BETO staff member regarding the content of their written responses to the RFI questions. Similarly, if a respondent is unable to submit written responses, or would otherwise prefer to do so, he/she may request a 30-minute individual discussion with a BETO staff member to verbally provide responses to the RFI questions. If a respondent wishes to participate in an individual discussion for either of these reasons, please submit your request to [Biofuels\\_FY22\\_RFI@ee.doe.gov](mailto:Biofuels_FY22_RFI@ee.doe.gov) and you will be contacted by a BETO staff member to schedule a time for the discussion.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.

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